GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

Richard E. Dunn, Director

Air Protection Branch
4244 International Parkway
Suite 120
Atlanta, Georgia 30354
404-363-7000

MEMORANDUM

April 20, 2020

To: Hamid Yavari and Brian Zhong
Thru: Byeong-Uk Kim
From: Yunhee Kim
Subject: **PSD and Toxics Modeling Review - UPDATE**
US Cement, LLC, Clinchfield, Houston County, GA

GENERAL INFORMATION

US Cement, LLC (hereafter, "US Cement") proposed to construct a modern greenfield dry-process Portland cement plant at a site northeast of Clinchfield in Houston County, Georgia. The plant will be rated 1.1 million tons of clinker per year. Air dispersion modeling for this application was conducted by US Cement's consultant, Koogler & Associates, Inc., to assess conformance of the proposed emission limits for the subject emission sources on the site with applicable federal Prevention of Significant Deterioration (PSD) air quality standards and GA EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*[1] (hereafter "Georgia Air Toxics Guideline").

This memo discusses the procedures used to review the supporting dispersion modeling. Based on the PSD applicability analysis, the projected emissions of CO, SO_2, NO_2, $PM_{2.5}$, and PM_{10} are in excess of their respective Significant Emission Rates (SERs). The maximum-modeled concentration of CO was less than its respective significant impact level (SIL); therefore, no further analysis was required for CO. The maximum-modeled concentrations of SO_2, NO_2, $PM_{2.5}$, and PM_{10} were greater than their respective SILs. For the $PM_{2.5}$ impact analysis, primary $PM_{2.5}$ emissions and secondary $PM_{2.5}$ formation due to the SO_2 and NO_X emissions from the proposed project were included.

Due to the SIL exceedances, subsequent refined modeling analyses were conducted. The refined modeling analyses showed that SO_2, NO_2, $PM_{2.5}$, and PM_{10} emissions from the proposed project do not cause any violations of their respective National Ambient Air Quality Standards (NAAQS) and their corresponding PSD Increment regulations, except for 24-hour $PM_{2.5}$ PSD Increment. A PSD culpability analysis for 24-hour $PM_{2.5}$ was conducted which shows contributions by the proposed facility are well below the 24-hour $PM_{2.5}$ SIL at all receptors exceeding the 24-hour $PM_{2.5}$ Increment for Class II areas. For the refined $PM_{2.5}$ impact analysis and the culpability analysis, primary $PM_{2.5}$ emissions and secondary $PM_{2.5}$ formation due to the SO_2 and NO_X emissions from the proposed project and the facilities within 53 km of the proposed site were included. The ozone ambient impact analysis shows no adverse impacts from the proposed project NO_X emissions.

Fifteen (15) toxic air pollutants (TAPs) were evaluated because their emissions were above their respective Minimum Emission Rates. The air toxic impact analyses for the fifteen (15) TAPs show no exceedances of the applicable Acceptable Ambient Concentrations (AACs). The results of these modeling evaluations are summarized in the following sections of this memorandum.

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[1] https://epd.georgia.gov/air/documents/toxics-impact-assessment-guideline

INPUT DATA

1. **Meteorological Data** – The hourly meteorological data (2014-2018) used in this review were generated and provided by GA EPD[2]. The data were processed from the meteorological measurement data obtained from the Middle Georgia Airport National Weather Service (NWS) surface station (GA) and the Atlanta Regional Airport NWS upper air station (GA) using AERSURFACE (v13016), AERMINUTE (v15272), and AERMET (v18081) with the adjusted surface friction velocity option (ADJ_U*). The applicant demonstrated the representativeness of the meteorological data by comparing the AERSURFACE-generated surface characteristics between the facility's location and the Middle Georgia Airport site. GA EPD concurred with the applicant's demonstration.

2. **Source Data** – Emission release parameters and emission rates of criteria pollutants and TAP emission rates were provided by the applicant and reviewed by the GA EPD Stationary Source Permitting Program (SSPP). Attachments F and I of the application summarized modeled point and volume source parameters and the facility-wide TAP emissions from the proposed project. Tables 1 and 2 from the application addendum (dated February 26, 2020) summarized the PM_{10} and $PM_{2.5}$ emissions from truck travel on unpaved and paved roads. The applicant revised the maximum 1-hour SO_2 emission rate from 56 lbs/hour to 196 lbs/hour (dated February 26, 2020). The applicant also revised the maximum 1-hour NO_2 emission rate from 210 lbs/hour to 366.5 lbs/hour (dated April 1, 2020). The revised 1-hour maximum SO_2 and NO_2 emission rates were calculated based on the maximum 1-hour average emission factors for the on-site raw materials.

3. **Receptor Locations** – Discrete receptors with 100-meter intervals were placed on a Cartesian grid along the fence line. For $PM_{2.5}$ and PM_{10} NAAQS analyses, receptors extend outwards from the fence line at 50-meter intervals to approximately 50 kilometers. For the $PM_{2.5}$ Increment analysis, receptors extend outwards from the fence line at 100-meter intervals to approximately 10 kilometers. For the annual NO_2 analysis, receptors extend outwards from the fence line at 100-meter intervals to approximately 15 kilometers. For 1-hour SO_2 and NO_2 analyses, receptors extend outwards from the fence line at 50-meter intervals to approximately 5 kilometers. For the TAP analysis, receptors extend outwards from the fence line at 50-meter intervals to approximately 5 kilometers. These domains are sufficient to capture the maximum impact of each pollutant. All receptor locations are represented in the Universal Transverse Mercator (UTM) projections, Zone 17, North American Datum 1983. The applicant provided its justification for fence line and property boundary between the facility and ambient air including its plan for routine patrolling, "No Trespassing" signs, secured and guarded gates, and the dense native forest and vegetation. SSPP reviewed and approved the justification.

4. **Terrain Elevation** – Topography was found to be generally flat in the site. Terrain data from USGS 1 arc-second National Elevation Dataset were extracted and the AERMAP terrain processor (v18081) was used to obtain the elevations of all sources and receptors. The resulting elevation data were verified by comparing contoured receptor elevations with a Google Earth map.

5. **Building Downwash** – The potential effect for building downwash was evaluated via the "Good Engineering Practice (GEP)" stack height analysis and based on the scaled site plan included in the application using the BPIPPRM program (v04274). The BPIPPRM model was used to derive building dimensions for the downwash assessment and the assessment of cavity-region concentrations appropriate for the AERMOD model.

[2] http://epd.georgia.gov/air/georgia-aermet-meteorological-data

6. **Background** – Background concentration monitors were selected based on (1) meteorological conditions (e.g., average and peak temperatures, humidity, and wind patterns), (2) terrain, (3) the rural or urban nature of the area, and (4) nearby regional sources of pollutants (e.g., biogenic emissions, other industry, etc.). Also, data availability was considered. Background concentrations were calculated by following the form and averaging time of the corresponding NAAQS. Below are justifications for selecting background monitors for individual pollutants.

   For 8-hour O_3, the Macon-Forestry monitor (AIRS 13-021-0012) in Bibb County was selected because of the proximity of the monitor to the facility location. The background concentration of 8-hour O_3 is 65 ppb based on the 3-year design value at the Macon-Forestry monitor for 2016-2018. The Macon-Forestry monitor is in a more urbanized area than the facility location. Therefore, this monitor conservatively represents the background 8-hour O_3 concentration at the project location.

   For 1-hour NO_2, the Yorkville monitor (AIRS 13-223-0003) in Paulding County was selected because this monitor represents the rural 1-hour NO_2 condition in GA. The 1-hour NO_2 background concentration is 30.3 $\mu g/m^3$ based on the three-year average value of the annual 98th percentile values over 2013-2015 at the Yorkville monitor.

   For 1-hour SO_2, the South Dekalb monitor in DeKalb County (AIRS 13-089-0002) was selected because this monitor can represent the 1-hour SO_2 condition for rural areas in GA without a major SO_2 source nearby. The 1-hour SO_2 background concentration is 6.2 $\mu g/m^3$ based on the three-year average values of the annual 99th percentile values at the South DeKalb monitor for 2016-2018. The South Dekalb monitor is in a more urbanized area than the facility location. Therefore, this monitor conservatively represents the background 1-hour SO_2 concentration at the project location.

   For 24-hour and annual $PM_{2.5}$, the Warner Robins monitor (AIRS 13-153-0001) in Houston County was selected because of the proximity of the monitor to the facility location. The annual and 24-hour $PM_{2.5}$ background concentrations are 18.2 $\mu g/m^3$ and 8.3 $\mu g/m^3$, respectively. These are design values for 2016-2018 at the Warner Robins monitor.

   For 24-hour PM_{10}, the Augusta monitor (AIRS 13-245-0091) in Richmond County was selected because this monitor can represent the 24-hour PM_{10} conditions near the facility including prescribed burn activities at a large military base. The 24-hour PM_{10} background concentration is 35 $\mu g/m^3$ that is the 4th highest value of all available daily measurements during 2016-2018.

CLASS I AREA IMPACT ANALYSIS

Five Class I areas exist within a 300 km range from the US Cement facility: Cohutta Wilderness (GA), Saint Marks Wilderness (FL), Okefenokee Wilderness (GA), Wolf Island Wilderness (GA), and Broadwell Bay Wilderness (FL).

To determine whether the proposed project is subject to the Class I Air Quality Related Values (AQRVs) assessments, a Q/D screening analysis was performed. Q is an emission sum of all visibility-affecting pollutants (in tons per year) emitted from the facility and calculated on a worse-case 24-hour period basis (FLAG 2010 approach). D is a distance (in kilometers) from the proposed facility to each corresponding Class I area boundary. An emission sum of all visibility affecting pollutants ($SO_2 + NO_X + PM_{10} + H_2SO_4$) from the facility is 1,284 tpy. The distance from the facility to the nearest Class I area, Okefenokee Wilderness (GA), is 232 km. The resulting Q/D ratio is 5.5. The Federal Land Managers (FLMs) typically do not require AQRVs assessments in nearby Class I areas (those within 300 km of the project site) if the Q/D ratio is less than 10. The applicant provided the Q/D evaluation results for nearby Class I areas to the applicable FLM agencies and requested their opinions. No comments were made by FLM agencies as April 8, 2020.

A Class I area significant impact analysis (Class I PSD Increment analysis) was performed using AERMOD (v19191) to assess the maximum concentrations of SO_2, NO_2, $PM_{2.5}$, and PM_{10} due to emissions from the facility without building downwash at a distance of 50 km from the project site. The receptors start and end at approximately 1 degree on either side of the azimuth to the Class I areas of interest and were spaced about 1-km apart on a 50 km circle from the facility in the direction of the Class I areas. Table 1 shows that the modeled maximum primary impacts of SO_2, NO_2, $PM_{2.5}$, and PM_{10}. SO_2, NO_2, and PM_{10} were below their respective Class I area SILs; therefore, no further analysis was required for those pollutants. Primary $PM_{2.5}$ was below its respective Class I area SIL; however, additional analyses were conducted (described below) to account for the impact of secondary $PM_{2.5}$ formation due to NO_X and SO_2 emissions.

Table 1. Project Impacts and Significant Impact Levels (Class I Areas).

Criteria Pollutant	Averaging Period	Significance Level	Maximum Projected Concentration*	Receptor UTM Zone: 17		Exceeds SIL?
		(μg/m³)	(μg/m³)	Easting (meter)	Northing (meter)	
SO_2	Annual	0.1	0.013	303,011.86	3,584,643.59	No
	24-Hour	0.2	0.139	238,047.61	3,544,049.42	No
	3-Hour	1.0	0.767	238,879.87	3,543,787.01	No
NO_2	Annual	0.1	0.045	303,011.86	3,584,643.59	No
PM_{10}	Annual	0.2	0.019	303,011.86	3,584,643.59	No
	24-Hour	0.3	0.174	303,468.00	3,593,347.22	No
$PM_{2.5}$**	Annual	0.05	0.005	303,011.86	3,584,643.59	No
	24-Hour	0.27	0.031	303,125.77	3,585,508.78	No

* Highest concentration over all averaging period.
** Primary emissions only.

As required by the 2017 revisions to EPA's *Guideline on Air Quality Models* (Appendix W), an analysis of the impact of the projected SO_2 and NO_X emissions on secondary $PM_{2.5}$ formation was required following EPA's "*Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier l Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program*" published on December 2, 2016 (hereafter, "EPA MERPs Guidance") and GA EPD's *"Guidance on the Use of EPA's MERPs to Account for Secondary Formation of Ozone and $PM_{2.5}$ in Georgia*" dated February 25, 2019 (hereafter, "GA EPD MERPs Guidance").

The projected $PM_{2.5}$ emission is 24.38 tpy, which is greater than the SER (10 tpy). To estimate the impact of secondary $PM_{2.5}$ formation on Class I areas, a Class I SIL analysis for $PM_{2.5}$ is required. Table 1 shows that the modeled maximum primary impacts of $PM_{2.5}$ were below their respective Class I area SILs. The applicant proposed to use averaged MERP values from applicable MERPs values from the Allendale and Tallapoosa hypothetical sources because the facility is located near the midpoint between these two hypothetical sources. GA EPD concurred with this proposal and the applicant used the average MERP values for subsequent analyses.

According to Equation (3) in the GA EPD MERPs Guidance, a total impact of primary and secondary $PM_{2.5}$ due to the proposed emission with regard to the annual $PM_{2.5}$ SIL can be determined as following:

$$\frac{HMC_{PM2.5}}{SIL_{PM2.5}} + \frac{PEMIS_{SO2}}{MERP_{SO2}} + \frac{PEMIS_{NOx}}{MERP_{NOx}} = \frac{0.005}{0.05} + \frac{220}{6,679} + \frac{825}{28,926} = 0.100 + 0.033 + 0.029 = 0.162 < 1,$$

HMC_PM2.5 is 0.005 μg/m^3, which is the highest modeled annual concentration using AERMOD with the proposed primary $PM_{2.5}$ emission (see Table 1). *SIL_PM2.5* is 0.05 μg/m^3 for the annual $PM_{2.5}$. *PEMIS_SO2* and *PEMIS_NO$_X$*, the proposed emission for SO_2 and NO_X, are 220 tpy and 825 tpy, respectively. *MERP_SO2* and *MERP_NO$_X$*, the annual $PM_{2.5}$ MERPs for SO_2 and NO_X, are 6,679 tpy and 28,926 tpy, respectively.

Similarly, the total impact of primary and secondary $PM_{2.5}$ due to the proposed emission increase with regard to the 24-hour $PM_{2.5}$ SIL is estimated as following:

$$\frac{HMC_{PM2.5}}{SIL_{PM2.5}} + \frac{PEMIS_{SO2}}{MERP_{SO2}} + \frac{PEMIS_{NOx}}{MERP_{NOx}} = \frac{0.031}{0.27} + \frac{220}{1,026} + \frac{825}{5,346} = 0.115 + 0.214 + 0.154 = 0.483 < 1,$$

HMC_PM2.5 is 0.031 μg/m^3, which is the highest modeled 24-hr concentration using AERMOD with the proposed primary $PM_{2.5}$ emission increase (see Table 1). *SIL_PM2.5* is 0.27 μg/m^3 for the 24-hr $PM_{2.5}$ SIL. *MERP_SO2* and *MERP*_NO_X, the 24-hr $PM_{2.5}$ MERPs for SO_2 and NO_X, are 1,026 tpy and 5,346 tpy, respectively.

Because both ratios are less than 1, the total $PM_{2.5}$ impacts are below the $PM_{2.5}$ Class I SILs at the annual and 24-hr averaging periods. Therefore, the applicant does not need to perform a cumulative analysis for $PM_{2.5}$.

CLASS II AREA IMPACT ANALYSIS

The Class II area significant impact analysis was conducted using the AERMOD model (v19191) for CO, SO_2, NO_2, $PM_{2.5}$, and PM_{10}. Table 2 shows the maximum-modeled concentrations from the significance modeling. SILs were exceeded for 1-hour SO_2, 1-hour NO_2, annual $PM_{2.5}$, 24-hour $PM_{2.5}$, annual PM_{10}, and 24-hour PM_{10}. The significant impact area (SIA) was determined for SO_2, NO_2, PM_{10}, and $PM_{2.5}$ as a circular area centered on the facility with a radius equal to the farthest distance where a receptor reached or exceeded the corresponding SIL. The radius of the SIA – the significant impact distance (SID) – were 12.7 km for 1-hour SO_2, 28.5 km for 1-hour NO_2, 2.2 km for annual $PM_{2.5}$, 3.0 km for 24-hour $PM_{2.5}$, 2.5 km for annual PM_{10}, and 6.4 km for 24-hour PM_{10}. Further refined modeling analyses were required for 1-hour SO_2, 1-hour NO_2, annual $PM_{2.5}$, 24-hour $PM_{2.5}$, annual PM_{10}, and 24-hour PM_{10} to assess the compliance with their corresponding NAAQS and applicable PSD Increment regulations.

A Class II SIL analysis for $PM_{2.5}$ is required to estimate the total impact of primary and secondary $PM_{2.5}$ formation on Class II areas. Table 2 shows that the modeled maximum impacts of $PM_{2.5}$ were above their respective Class II area SILs. According to Equation (3) in the GA EPD MERPs Guidance, the total impact of primary and secondary $PM_{2.5}$ due to the proposed emission with regard to the annual $PM_{2.5}$ SIL can be determined as following:

$$\frac{HMC_{PM2.5}}{SIL_{PM2.5}} + \frac{PEMIS_{SO2}}{MERP_{SO2}} + \frac{PEMIS_{NOx}}{MERP_{NOx}} = \frac{1.41}{0.2} + \frac{220}{19,059} + \frac{825}{97,422} = 7.050 + 0.012 + 0.009 = 7.071 > 1,$$

HMC_PM2.5 is 1.41 μg/m^3, which is the highest modeled annual concentration using AERMOD with the proposed primary $PM_{2.5}$ emission (see Table 2). *SIL_PM2.5* is 0.2 μg/m^3 for the annual $PM_{2.5}$ SIL.

Similarly, the total impact of primary and secondary $PM_{2.5}$ due to the proposed emission increase with regard to the 24-hour $PM_{2.5}$ SIL is estimated as following:

$$\frac{HMC_{PM2.5}}{SIL_{PM2.5}} + \frac{PEMIS_{SO2}}{MERP_{SO2}} + \frac{PEMIS_{NOx}}{MERP_{NOx}} = \frac{4.7}{1.2} + \frac{220}{3{,}388} + \frac{825}{18{,}562} = 3.917 + 0.065 + 0.044 = 4.026 > 1,$$

HMC_PM2.5 is 4.70 μg/m^3, which is the highest modeled 24-hr concentration using AERMOD with the proposed primary $PM_{2.5}$ emission increase (see Table 2). *SIL_PM2.5* is 1.2 μg/m^3 for the 24-hr $PM_{2.5}$ SIL.

For annual $PM_{2.5}$ and 24-hour $PM_{2.5}$, the total $PM_{2.5}$ impact (primary and secondary $PM_{2.5}$) is above the $PM_{2.5}$ Class II SIL at the annual and 24-hr averaging periods. Therefore, the applicant needed to perform cumulative analyses for the annual and 24-hr $PM_{2.5}$.

Table 2. Project Impacts and Significant Impact Levels (Class II Areas).

Criteria Pollutant	Averaging Period	Significant Impact Level (μg/m^3)	Maximum Projected Concentration* (μg/m^3)	Receptor UTM Zone: 17 Easting (meter)	Receptor UTM Zone: 17 Northing (meter)	Exceeds SIL?	Radius of the SIA** (km)
CO	8-Hour	500	28.35	252,021.25	3,591,862.72	No	N/A
	1-hour	2000	98.20	253,237.99	3,590,125.04	No	N/A
SO_2	Annual#	1	0.56	254,498.46	3,591,302.25	No	N/A
	24-Hour	5	4.85	254,498.46	3,591,302.25	No	N/A
	3-Hour	25	21.69	255,198.46	3,591,802.25	No	N/A
	1-Hour+	7.8	26.58	253,298.46	3,590,102.25	**Yes**	**12.7**
NO_2	Annual#	1	0.54	254,498.46	3,591,302.25	No	N/A
	1-Hour+	7.5	44.7	253,298.46	3,590,102.25	**Yes**	**28.5**
PM_{10}	Annual#	1	5.85	253,241.00	3,591,943.50	**Yes**	**2.5**
	24-Hour#	5	50.33	253,616.22	3,588,981.00	**Yes**	**6.4**
$PM_{2.5}$##	Annual#	0.2	1.41	253,241.00	3,591,943.50	**Yes**	**2.2**
	24-Hour#	1.2	4.70	253,198.46	3,592,002.25	**Yes**	**3.0**

* Highest concentration over all averaging periods, except 1-hour NO_2, SO_2, and annual and 24-hour $PM_{2.5}$.
+ Highest of the daily max 1-hour concentration across all receptors averaged over 5-years modeling.
# Highest of the average individual year's highest annual and 24-hour concentration across all receptors over 5-year modeling.
Primary emissions only.
** Maximum significant impact distances used to define pollutants-specific modeling areas indicated in bold font.

Preconstruction Monitoring Evaluation

GA EPD compared the maximum-modeled concentrations with the Significant Monitoring Concentrations (SMCs) to determine whether the facility is required to conduct preconstruction monitoring. Table 3 shows that the maximum modeled concentrations of CO, SO_2, and NO_2 are below their respective SMCs. Thus, the applicant is exempted from preconstruction monitoring requirements for those pollutants. However, the modeled concentration of PM_{10} is above its SMC and, therefore, preconstruction monitoring would be required. In lieu of such monitoring effort, existing GA EPD ambient air data from a representative regional monitoring station have been provided as part of the application.

Table 3. Project Pollutant Monitoring De Minimis Impacts.

Criteria Pollutant	Averaging Period	*Significant Monitoring* Concentration (µg/m³)	Maximum Projected Concentration* (µg/m³)	Receptor UTM Zone: 17 Easting (meter)	Northing (meter)	Exceeds SMCs?
CO	8-Hour	575	28.35	252,021.25	3,591,862.72	No
SO_2	24-Hour	13	4.85	254,498.46	3,591,302.25	No
NO_2	Annual	14	0.54	254,498.46	3,591,302.25	No
PM_{10}	24-Hour	10	50.33	253,616.22	3,588,981.00	**Yes**

* Highest concentration over all averaging periods.

The proposed US Cement facility is expected to emit 89 tons/year PM_{10}. The GA EPD PM_{10} monitor (AIRS 13-245-0091) at Bungalow Road, Augusta, Richmond County, is considered to be conservatively representative of the air quality at the project site because the terrain and geographical features between the project site and Augusta site are similar and due to the significantly more populated Augusta area. In addition, both sites are located near large military bases where active prescribed burning activities are expected. The Augusta monitoring site is about 118 miles away from the facility, and the 4th high 24-hour values among all available daily measurements for 2016-2018 is 35 µg/m^3.

Ozone Impact Analysis

If the proposed project results in a net VOC or NO_X emission increase greater than 100 tpy, the PSD rule requires an evaluation to determine whether pre-construction monitoring is warranted for ground level ozone. The proposed US Cement project is expected to emit 825 tpy NO_X emission and 80 tpy VOC emission. There are no existing ozone monitors in the Houston County. The Macon-Forestry monitor (AIRS 13-021-0012) in Dry Branch, Bibb County, located approximately 26.7 miles away from the facility, is considered to be conservatively representative of the air quality at the project site. The latest design value (i.e., 3-year average of 4th highest maximum daily 8-hour ozone concentrations during 2016-2018) is 65 ppb. This area is in attainment with the 2015 ozone NAAQS (70 ppb).

As required by the 2017 revisions to EPA's *Guideline on Air Quality Models* (Appendix W), an analysis of the impact of the projected NO_X emissions on secondary ozone formation was required following EPA MERPs Guidance and GA EPD MERPs Guidance. According to the GA EPD MERPs guidance, Applicable MERPs from the Allendale and Tallapoosa hypothetical sources are averaged and the average values used for US Cement as the Class II area NO_X and VOC MERPs for ozone in Georgia are 264 tpy and 26,729 tpy, respectively. According to Equation (2) in the GA EPD MERPs Guidance, the impact from ozone formation due to precursor emissions is estimated as following:

$$\frac{PEMIS_{NOx}}{MERP_{NOx}} + \frac{PEMIS_{VOC}}{MERP_{VOC}} = \frac{825}{264} + \frac{80}{26{,}729} = 3.125 + 0.003 = 3.128 > 1$$

PEMIS_NO$_X$ and *PEMIS_VOC*, the proposed emission for NO_X and VOC, are 825 tpy and 80 tpy, respectively. The total impact is above the ozone SIL (1 ppb). Therefore, the applicant needs to perform cumulative analysis for ozone.

REGIONAL SOURCE INVENTORIES

The significance modeling above shows four criteria pollutants (SO_2, NO_2, PM_{10}, and $PM_{2.5}$) exceeded their applicable SILs with a SID of 28.5 km for 1-hour NO_2, 12.7 km for 1-hour SO_2, 2.5 km for annual PM_{10}, 6.4 km for 24-hour PM_{10}, 2.2 km for annual $PM_{2.5}$, and 3.0 km for 24-hour $PM_{2.5}$. Therefore, refined modeling analysis is required to assess their compliance with the NAAQS and PSD Increment rules.

GA EPD developed an online PSD modeling inventory[3]. The applicant evaluated all major and minor sources within SIDs plus 50 km (total screening area) for possible inclusion in the refined NAAQS and PSD Increment analyses. The Minor Source Baseline Date (MinSBD) for NO_2 in Georgia (May 5, 1988) was also used to determine if a particular NO_X source had to be included in the NO_2 Increment inventory. The trigger date for $PM_{2.5}$ increment is October 20, 2011. The trigger date for PM_{10} and SO_2 increment is August 7, 1977. The 20D methodology was applied to screen out those facilities not large enough (in terms of emission rates) to be included in the modeling analysis except for those facilities located within the SIA. All facilities within the SIA were included regardless of the magnitude of the emissions. Regional sources located within 2 km of each other were clustered together and their total emissions were used to apply the 20D methodology. The Ambient Ratio Method 2 approach was applied to all NO_X emissions and a range of NO_X-to-NO_2 ratios, 0.5-0.9, was multiplied by the modeled NO_2 concentrations. Revised Appendix M (dated April 2, 2020) summarized the "20D" screening, stack parameters, and emission rates for all sources included in the cumulative modeling analysis.

NAAQS ANALYSIS

The 1-hour NO_2, 1-hour SO_2, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and annual $PM_{2.5}$ NAAQS compliance demonstrations were conducted using the latest AERMOD version (v19191) with the facility-wide NO_2, SO_2, PM_{10}, and $PM_{2.5}$ emission plus the ambient background concentrations. The modeled receptors were limited to those locations where the US Cement facility was shown to have a potentially significant impact (modeled concentration greater than the SIL). The 1-hour NO_2 background concentrations of 30.3 µg/m^3 was used. The applicant noted that the stack gas temperatures and velocities from the Robins Air Force Base Sources were abnormally low. Hence, the applicant discussed the matter with SSPP. Upon SSPP's concurrence, the applicant updated and provided the revised stack gas temperatures and velocities in Table 1 of the application (dated April 1, 2020). The 1-hour SO_2 background concentrations of 6.2 µg/m^3 was used. The 24-hour PM_{10} background concentrations of 35 µg/m^3 was obtained from the Augusta monitor. The annual and 24-hour $PM_{2.5}$ background concentrations (design values for 2016-2018) were obtained from the Warner Robins monitor.

According to Equation (6) in the GA EPD MERPs Guidance, the impact from secondary $PM_{2.5}$ formation on annual $PM_{2.5}$ is estimated as following:

$$Background_{PM2.5} + MDV_{PM2.5} + \left(\frac{FEMIS_{SO2}}{MERP_{SO2}} + \frac{FEMIS_{NOx}}{MERP_{NOx}}\right) * SIL_{PM2.5} = 8.3 + 2.3 + \left(\frac{220}{19{,}059} + \frac{825}{97{,}422}\right) * 0.2$$

$$= 8.3 + 2.3 + 0.004 = 10.6 < 12,$$

$Background_{PM2.5}$ is 8.3 µg/m^3, which is the 3-year design value from a representative background $PM_{2.5}$ monitor (the Warner Robins monitor). $MDV_{PM2.5}$ is 2.3 µg/m^3, which is the modeled design value concentration (not including background) using AERMOD with the proposed primary (direct) $PM_{2.5}$ emissions and primary $PM_{2.5}$ emissions from nearby offsite sources (see Table 4). *FEMIS_SO2* and *FEMIS_NO$_X$*, the facility-wide emissions for SO_2 and NO_X, are 220 tpy and 825 tpy, respectively. $SIL_{PM2.5}$ is 0.2 µg/m^3 for the annual $PM_{2.5}$ SIL.

[3] https://psd.gaepd.org/inventory/

Similarly, the impact from secondary $PM_{2.5}$ formation on 24-hour $PM_{2.5}$ is estimated as following:

$$Background_{PM2.5} + MDV_{PM2.5} + \left(\frac{FEMIS_{SO2}}{MERP_{SO2}} + \frac{FEMIS_{NOx}}{MERP_{NOx}}\right) * SIL_{PM2.5} = 18.2 + 8.17 + \left(\frac{220}{3{,}388} + \frac{825}{18{,}562}\right) * 1.2$$

$$= 18.2 + 8.17 + 0.13 = 26.5 < 35,$$

$Background_{PM2.5}$ is 18.2 µg/m³, which is the 3-year design value from a representative background $PM_{2.5}$ monitor (the Warner Robins monitor). $MDV_{PM2.5}$ is 8.17 µg/m³, which is the modeled design value concentration (not including background) using AERMOD with the proposed primary (direct) $PM_{2.5}$ emission increase and primary $PM_{2.5}$ emissions from nearby offsite sources (see Table 4). *FEMIS_SO2* and *FEMIS_NO$_X$*, the facility-wide emissions for SO_2 and NO_X, are 220 tpy and 825 tpy, respectively. $SIL_{PM2.5}$ is 1.2 µg/m³ for the 24-hour $PM_{2.5}$ SIL.

According to Equation (5) in the GA EPD MERPs Guidance, the impact from secondary O_3 formation due to precursor emissions is estimated as following:

$$Background_{ozone} + \left(\frac{FEMIS_{voc}}{MERP_{voc}} + \frac{FEMIS_{NOx}}{MERP_{NOx}}\right) * SIL_{ozone} = 65 + \left(\frac{80}{26{,}729} + \frac{825}{264}\right) * 1.0$$

$$= 65 + 3.13 = 68.13 < 70,$$

$Background_{ozone}$ is 65 ppb, which is the 2016-2018 design value from a representative background ozone monitor (the Macon-Forestry monitor). Applicable MERPs from the Allendale and Tallapoosa hypothetical sources were averaged and used by US Cement. The Class II area NO_X and VOC MERP values for ozone are 264 tpy and 26,729 tpy, respectively. *FEMIS_NO$_X$* and *FEMIS_VOC*, the facility-wide emissions for NO_X and VOC, are 825 tpy and 80 tpy, respectively.

Table 4. Class II Area NAAQS Assessment.

Pollutants	Averaging Period	Predicted Concentration* (µg/m³)	Secondary Contribution** (µg/m³)	Background Concentration (µg/m³)	Total Impact*** (µg/m³)	NAAQS (µg/m³)	Receptor Location UTM Zone: 17	
							Easting (meter)	Northing (meter)
SO_2	1-hour	93.9	N/A	6.2	100.1	196	245,498.46	3,583,602.25
NO_2	1-hour	114.2	N/A	30.3	144.5	188	249,123.00	3,620,274.00
PM_{10}	24-hour	18.7	N/A	35	53.7	150	253,156.50	3,591,972.25
$PM_{2.5}$	Annual	2.3	0.004	8.3	10.6	12	252,998.46	3,592,502.25
	24 Hour	8.17	0.13	18.2	26.5	35	252,998.46	3,592,502.25

* Highest concentration for annual averaging periods, and the highest of the average 1st-highest concentration across all receptors over the five modeling years for $PM_{2.5}$ annual.

** Secondary $PM_{2.5}$ concentration (MERP) estimated from the NO_X and SO_2 emissions at the proposed facility to account for secondary $PM_{2.5}$ formation.

*** Total impact is the sum of the predicted concentration, secondary $PM_{2.5}$ (MERP), plus the background concentration.

Table 4 shows the predicted concentrations of SO_2, NO_2, PM_{10}, and $PM_{2.5}$ (including secondary $PM_{2.5}$) and their corresponding background concentrations do not exceed the corresponding NAAQS levels. Therefore, US Cement will not cause or contribute a significant impact to the NAAQS.

CLASS II PSD INCREMENT ANALYSIS

Similar to the NAAQS analysis, a modeling analysis was conducted using the AERMOD model and regional source inventories used in the NAAQS analysis. The modeling results presented in Table 5 demonstrate that the proposed facility will not exceed the allowable PSD Increments except for 24-hour $PM_{2.5}$.

Table 5. CLASS II Area PSD Increment Assessment

Pollutant	Averaging Period	Allowable Increment (μg/m³)	Predicted Concentration* (μg/m³)	Secondary Contribution** (μg/m³)	Maximum Increment Consumed*** (μg/m³)	Receptor Location UTM Zone: 17	
						(Easting meter)	(Northing meter)
$PM_{2.5}$	Annual	4	1.88	0.004	1.884	252,998.46	3,592,502.25
	24-Hour	9	17.38	0.13	**17.51**	252,998.46	3,592,502.25
PM_{10}	Annual	17	6.46	---	6.46	253,241.00	3,591,943.50
	24-Hour	30	25.5	---	25.5	253,712.78	3,590,098.00

* Highest concentration for annual averaging periods and highest second high concentration for the 24-hour averaging period.
** Secondary $PM_{2.5}$ concentration estimated from the NO_X and SO_2 emissions at the proposed facility and nearby sources to account for secondary $PM_{2.5}$ formation.
*** Maximum increment consumed is the sum of the predicted concentration and secondary $PM_{2.5}$ (MERP) concentration.

The modeling identified the exceedances of the Class II PSD Increment for 24-hour $PM_{2.5}$ as shown in Table 5. Considering the location of the exceeding receptors, a culpability analysis was conducted to determine if this exceedance is caused by a significant contribution due to the emissions from the proposed facility using the MAXDCONT option in AERMOD. Tables A1-A5 in Appendix A of this modeling memo show the 24-hour $PM_{2.5}$ increment exceeding receptors for each year (2014-2018), where a modeled exceedance of the 9 μg/m³ was observed after considering the secondary $PM_{2.5}$ estimates from the NO_X and SO_2 emissions at the proposed facility and nearby offsite sources. Figure A1 in Appendix A of this modeling memo shows the maximum 24-hour $PM_{2.5}$ increment across the 5-year period (2014-2018) due to primary $PM_{2.5}$ emissions as well as secondary $PM_{2.5}$ from the NO_X and SO_2 emissions at the proposed facility and nearby offsite sources.

The Increment exceedances occurs from 2nd rank to 8th rank, but no exceedances afterwards. This refined modeling demonstrates that US Cement will not cause or contribute a significant impact to the PSD allowable increment exceedances at the 24-hour $PM_{2.5}$ averaging period.

AIR TOXICS ASSESSMENT

The impacts of facility-wide TAP emissions were evaluated to demonstrate compliance according to the Georgia Air Toxics Guideline. Fifteen (15) TAPs were included in the analysis: arsenic, barium, benzene, cadmium, chromium, copper, fluorides, formaldehyde, hydrogen chloride, hydrogen fluoride, lead, manganese, naphthalene, selenium, and sulfuric acid. The annual, 24-hour, and 15-minute AACs of the fifteen (15) TAPs were reviewed based on U.S. EPA IRIS reference concentration (RfC), OSHA Permissible Exposure (PEL), ACGIH Threshold Limit Values (TLV) including STEL (short term exposure limit) or ceiling limit, and NIOSH Recommended Levels (RELs) according to the Georgia Air Toxics Guideline. The modeled MGLCs were calculated using the AERMOD dispersion model (v18081) for annual, 24-hour, and 1-hour averaging periods.

Table 6 summarizes the AAC levels and MGLCs of the fifteen (15) TAPs. The maximum 15-minute impact is based on the maximum 1-hour modeled impact multiplied by a factor of 1.32. As shown in Table 6, the modeled MGLCs for all fifteen (15) TAPs are below their respective AAC levels.

Table 6. Modeled MGLCs and the respective AACs.

Pollutant	CAS	Averaging period	MGLC ($\mu g/m^3$)*	AAC ($\mu g/m^3$)	Exceed AAC?	Averaging period	MGLC ($\mu g/m^3$)*	AAC ($\mu g/m^3$)	Exceed AAC?
Arsenic	7440382	Annual	3.84E-06	2.33E-04	No	15-min	5.52E-04	0.2	No
Barium	7440393	24-hour	1.59E-03	1.19E+00	No				
Benzene	71432	Annual	5.12E-03	1.30E-01	No	15-min	7.35E-01	1600	No
Cadmium	7440439	Annual	7.05E-07	5.56E-03	No	15-min	1.01E-04	30	No
Chromium	7440473	Annual	4.48E-05	8.30E-05	No	15-min	6.43E-03	10	No
Copper	7440508	24-hour	1.84E-02	2.40E+00	No				
Fluorides	16984488	24-hour	3.12E-03	5.95E+00	No				
Formaldehyde	50000	Annual	1.47E-04	1.10E+00	No	15-min	2.11E-02	245	No
Hydrogen chloride	7647010	Annual	4.84E-03	2.00E+01	No	15-min	6.95E-01	700	No
Hydrogen fluoride	7664393	24-hour	3.12E-03	5.84E+00	No	15-min	4.14E-02	245	No
Lead	7439921	24-hour	1.61E-04	1.20E-01	No				
Manganese	7439965	Annual	2.75E-04	5.00E-02	No	15-min	3.95E-02	500	No
Naphthalene	91203	Annual	5.44E-04	3.00E+00	No	15-min	7.81E-02	7500	No
Selenium	7782492	24-hour	6.93E-04	0.48	No				
Sulfuric acid	7664939	24-hour	3.12E-03	2.4	No	15-min	4.14E-02	300	No

* Highest concentration over all averaging periods.

ADDITIONAL IMPACTS ANALYSIS

To address the potential soil and vegetation impacts, the applicant adopted the NAAQS analysis presented above because EPA recently proposed to use the secondary NAAQS standards for such analysis. Note that impacts of CO and annual NO_2 emissions were not significant in comparison with their respective SILs. Table 7 shows the total potential impacts of 1-hour SO_2, 1-hour NO_2, 24-hour PM_{10}, annual $PM_{2.5}$, and 24-hour $PM_{2.5}$ are all below their respective secondary NAAQS. Therefore, no detrimental effects on soil or vegetation are expected from the proposed facility.

In addition, emissions from the proposed facility were compared to the significant emission rates according to the US EPA guidance document "*A Screening Procedure for the Impact of air Pollution Sources on the Plants, Soils, and Animals*" (December 1980). Potential annual emissions from the proposed facility are all below the significant emission rates in the guidance.

Table 7. Class II Area Vegetative Impact Results (AERMOD with downwash)

Pollutant	Averaging Period	All Source Impact *	Background Concentration	Total Potential Impact*	Secondary NAAQS	Exceed Secondary NAAQS Level?
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	
SO_2	1-hour	93.9	6.2	100.1	196	No
NO_2	1-hour	102.6	30.3	132.9	188	No
PM_{10}	24-hour	18.7	35	53.7	150	No
$PM_{2.5}$	Annual	2.3	8.3	10.6	15	No
	24-hour	8.2	18.2	26.4	35	No

* NAAQS results including facility-wide emissions and offsite inventories. A total impact is a sum of the predicted concentration plus the background concentration.

Class II Visibility Analysis

The Class II area visibility analyses can be required for airports, stack parks, and state historic sites located within the proposed source (less than 50 km). There are two national park sites within the proposed facility: (1) Ocmulgee National Monument located approximately 42.7 km north of the US Cement site and (2) Andersonville National Historic Site located approximately 54.5 km southwest of the US Cement site. The applicant utilized the VISCREEN model for the visibility analysis at the two Class II national park receptor locations. A level 1 screening analysis was performed using the background visual range level of 25 km with all other level 1 default values in VISCREEN. No significant impacts on Ocmulgee National Monument and Andersonville National Historic Site were found since the screening criteria were not exceeded. Therefore, the Class II visibility analyses showed no issues based on impacts for the two national park Class II areas.

CONCLUSIONS

The project's air quality analyses including a culpability analysis for 24-hour $PM_{2.5}$ described in this memo show conformance with Class I and Class II PSD NAAQS and Increment rules. No Class I AQRV analysis was required by the FLMs. A Class II area visibility analysis was conducted with the VISCREEN model and showed conformance. The proposed project will not cause or contribute to an exceedance of any NAAQS or any allowable increment. The air toxics analysis shows conformance with the Georgia Air Toxics Guideline. The additional impacts analysis indicates that air quality impacts on vegetation is expected to be minimal. For these reasons, it is recommended a permit to be issued based on the project design and operating hours described in the application.

Appendix A:
Source Contribution Analysis for 24-hour $PM_{2.5}$ Increment

Table A1. Source contribution analysis for 24-hour $PM_{2.5}$ increment (2014).

Exceedance #	X	Y	All Primary $PM_{2.5}$ ($\mu g/m^3$)*	US Cement Primary $PM_{2.5}$ ($\mu g/m^3$)	US Cement Secondary $PM_{2.5}$ ($\mu g/m^3$)	US Cement Total $PM_{2.5}$ ($\mu g/m^3$)
1	252,998.46	3,592,402.25	13.720	0.004	0.131	0.136
2	252,898.46	3,592,402.25	13.437	0.006	0.131	0.137
3	253,098.46	3,592,302.25	10.727	0.006	0.131	0.137
4	252,998.46	3,592,302.25	10.442	0.953	0.131	1.085
5	252,998.46	3,592,502.25	9.824	0.008	0.131	0.140
6	252,698.46	3,592,702.25	9.254	0.423	0.131	0.554
7	253,098.46	3,592,402.25	8.828	0.003	0.131	0.134

* The cutoff threshold for a total primary $PM_{2.5}$ impact is 8.664 (= 9.0 - 0.131 - 0.205) $\mu g/m^3$ where 0.131 $\mu g/m^3$ and 0.205 $\mu g/m^3$ are secondary $PM_{2.5}$ impacts due to NO_X and SO_2 emissions from US Cement and all offsite sources, respectively.

Table A2. Source contribution analysis for 24-hour $PM_{2.5}$ increment (2015).

Exceedance #	X	Y	All Primary (µg/m^3)*	US Cement Primary $PM_{2.5}$ (µg/m^3)	US Cement Secondary $PM_{2.5}$ (µg/m^3)	US Cement Total $PM_{2.5}$ (µg/m^3)
1	252,598.46	3,592,502.25	15.334	0.004	0.131	0.135
2	252,498.46	3,592,502.25	11.599	0.003	0.131	0.135
3	252,898.46	3,592,402.25	11.134	0.004	0.131	0.135
4	252,998.46	3,592,402.25	10.764	0.004	0.131	0.135
5	252,598.46	3,592,402.25	10.761	0.002	0.131	0.133
6	252,998.46	3,592,302.25	10.226	0.007	0.131	0.139
7	253,098.46	3,592,302.25	9.229	0.006	0.131	0.137
8	252,698.46	3,592,702.25	9.037	0.311	0.131	0.442
9	252,698.46	3,592,402.25	9.016	0.013	0.131	0.144
10	252,498.46	3,592,402.25	8.778	0.002	0.131	0.133
11	252,698.46	3,592,602.25	8.699	0.596	0.131	0.727

* The cutoff threshold for a total primary $PM_{2.5}$ impact is 8.664 (= 9.0 - 0.131 - 0.205) µg/m^3 where 0.131 µg/m^3 and 0.205 µg/m^3 are secondary $PM_{2.5}$ impacts due to NO_X and SO_2 emissions from US Cement and all offsite sources, respectively.

Table A3. Source contribution analysis for 24-hour $PM_{2.5}$ increment (2016).

Exceedance #	X	Y	All Primary ($\mu g/m^3$)*	US Cement Primary $PM_{2.5}$ ($\mu g/m^3$)	US Cement Secondary $PM_{2.5}$ ($\mu g/m^3$)	US Cement Total $PM_{2.5}$ ($\mu g/m^3$)
1	252,998.46	3,592,402.25	14.888	0.005	0.131	0.136
2	252,898.46	3,592,402.25	12.719	0.102	0.131	0.233
3	252,998.46	3,592,502.25	11.091	0.003	0.131	0.134
4	253,098.46	3,592,302.25	10.824	0.007	0.131	0.138
5	252,698.46	3,592,702.25	10.146	0.438	0.131	0.569
6	252,998.46	3,592,302.25	10.109	0.004	0.131	0.135
7	252,598.46	3,592,502.25	9.632	0.003	0.131	0.135
8	253,098.46	3,592,502.25	8.848	0.006	0.131	0.137
9	252,998.46	3,592,202.25	8.758	0.165	0.131	0.296
10	253,098.46	3,592,402.25	8.728	0.003	0.131	0.135
11	252,998.46	3,592,602.25	8.675	0.007	0.131	0.138

* The cutoff threshold for a total primary $PM_{2.5}$ impact is 8.664 (= 9.0 - 0.131 - 0.205) $\mu g/m^3$ where 0.131 $\mu g/m^3$ and 0.205 $\mu g/m^3$ are secondary $PM_{2.5}$ impacts due to NO_X and SO_2 emissions from US Cement and all offsite sources, respectively.

Table A4. Source contribution analysis for 24-hour $PM_{2.5}$ increment (2017).

Exceedance #	X	Y	All Primary ($\mu g/m^3$)*	US Cement Primary $PM_{2.5}$ ($\mu g/m^3$)	US Cement Secondary $PM_{2.5}$ ($\mu g/m^3$)	US Cement Total $PM_{2.5}$ ($\mu g/m^3$)
1	252,998.46	3,592,402.25	12.021	0.004	0.131	0.135
2	252,898.46	3,592,702.25	10.281	0.016	0.131	0.147
3	252,498.46	3,592,402.25	9.705	0.004	0.131	0.135
4	252,998.46	3,592,502.25	9.652	0.003	0.131	0.134
5	252,998.46	3,592,302.25	9.527	0.005	0.131	0.136
6	252,898.46	3,592,402.25	9.524	0.012	0.131	0.144
7	252,698.46	3,592,502.25	9.469	0.004	0.131	0.135
8	252,598.46	3,592,502.25	9.301	0.003	0.131	0.134
9	253,098.46	3,592,402.25	9.115	0.003	0.131	0.134
10	252,398.46	3,592,402.25	9.106	0.004	0.131	0.135
11	253,098.46	3,592,502.25	9.074	0.003	0.131	0.134
12	252,998.46	3,592,202.25	8.700	0.007	0.131	0.138

* The cutoff threshold for a total primary $PM_{2.5}$ impact is 8.664 (= 9.0 - 0.131 - 0.205) $\mu g/m^3$ where 0.131 $\mu g/m^3$ and 0.205 $\mu g/m^3$ are secondary $PM_{2.5}$ impacts due to NO_X and SO_2 emissions from US Cement and all offsite sources, respectively.

Table A5. Source contribution analysis for 24-hour $PM_{2.5}$ increment (2018).

exceedance #	X	Y	All Primary (µg/m^3)*	US Cement Primary $PM_{2.5}$ (µg/m^3)	US Cement Secondary $PM_{2.5}$ (µg/m^3)	US Cement Total $PM_{2.5}$ (µg/m^3)
1	252,998.46	3,592,502.25	17.379	0.003	0.131	0.134
2	253,098.46	3,592,502.25	13.239	0.003	0.131	0.134
3	252,598.46	3,592,502.25	11.569	0.003	0.131	0.134
4	252,898.46	3,592,402.25	11.224	0.005	0.131	0.137
5	252,998.46	3,592,302.25	11.087	0.007	0.131	0.139
6	253,198.46	3,592,502.25	10.613	0.003	0.131	0.134
7	252,998.46	3,592,402.25	10.477	0.003	0.131	0.134
8	253,098.46	3,592,202.25	9.788	0.008	0.131	0.139
9	252,698.46	3,592,602.25	9.316	0.116	0.131	0.247
10	252,498.46	3,592,502.25	9.186	0.003	0.131	0.134
11	252,698.46	3,592,502.25	9.151	0.059	0.131	0.191
12	253,098.46	3,592,302.25	9.028	0.005	0.131	0.136
13	252,598.46	3,592,602.25	8.964	0.003	0.131	0.134
14	252,798.46	3,592,702.25	8.849	0.629	0.131	0.760

* The cutoff threshold for a total primary $PM_{2.5}$ impact is 8.664 (= 9.0 - 0.131 - 0.205) µg/m^3 where 0.131 µg/m^3 and 0.205 µg/m^3 are secondary $PM_{2.5}$ impacts due to NO_X and SO_2 emissions from US Cement and all offsite sources, respectively.

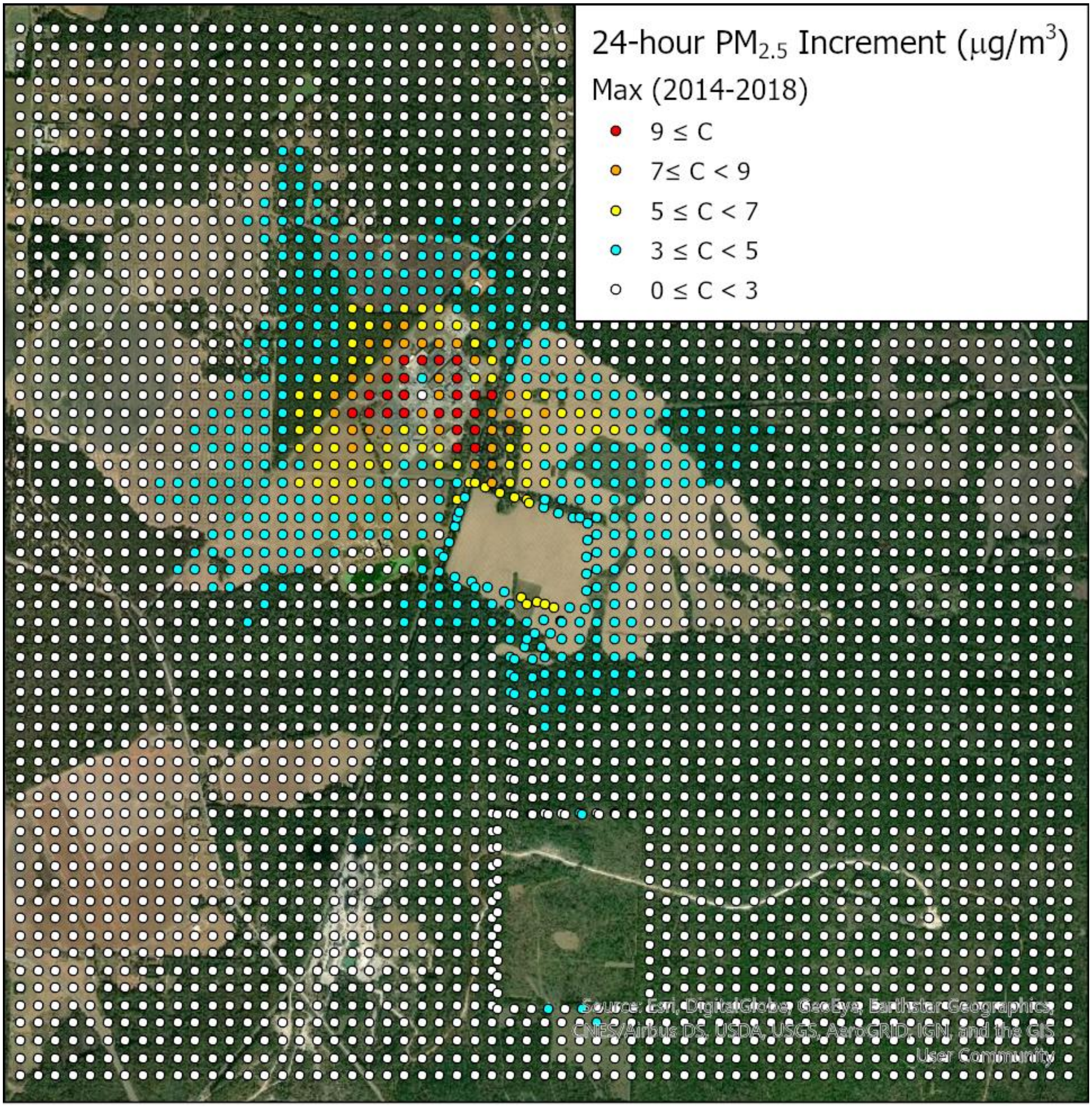

Figure A1. Spatial distribution of 24-hour $PM_{2.5}$ increment consumption. "C" denotes a total $PM_{2.5}$ increment consumption that is a sum of the primary $PM_{2.5}$ concentration from AERMOD and the secondary $PM_{2.5}$ concentration due to NO_X and SO_2 emissions from the US Cement facility and all off-site sources.